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OFFICIAL PROCEEDINGS
Meeting of April, 1919.

Volume XVIII.
No. - - - 4

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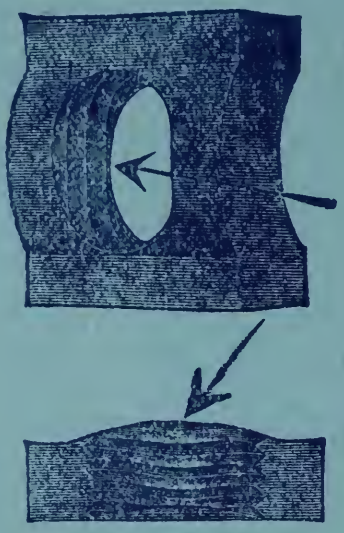

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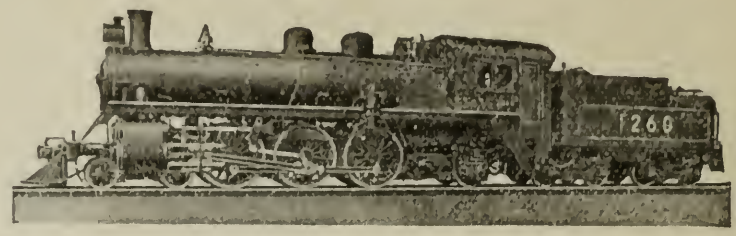

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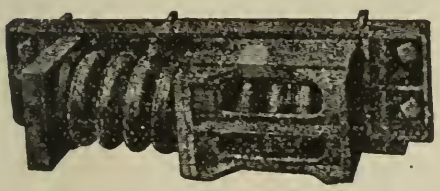

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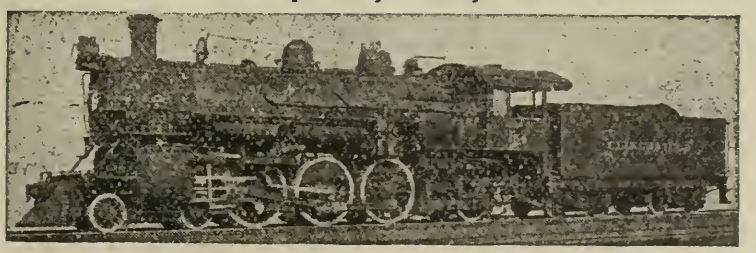

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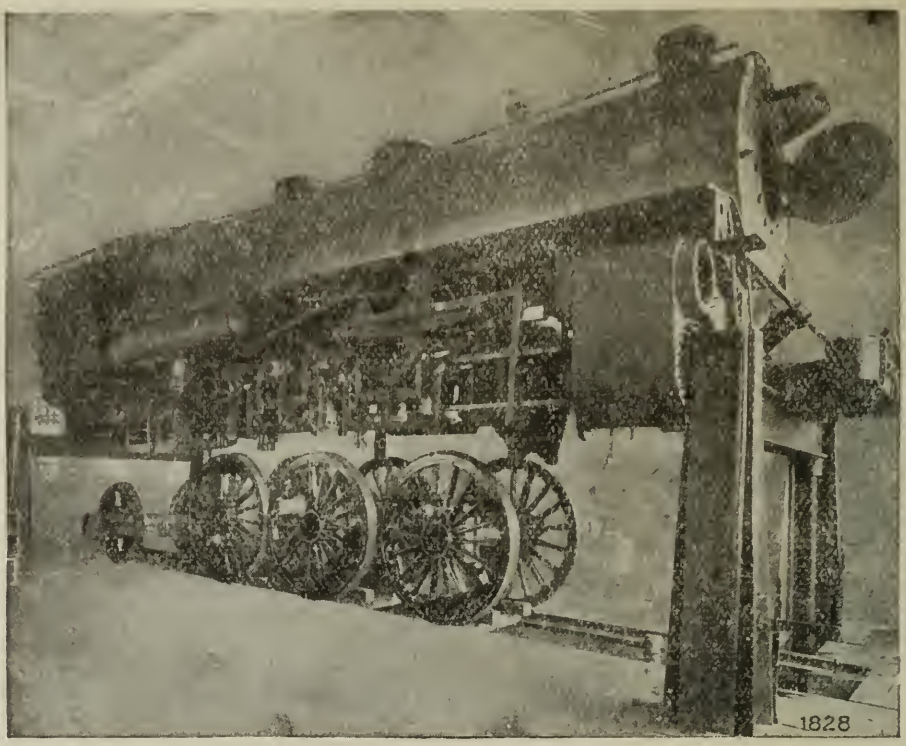

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PROCEEDINGS OF THE CANADIAN RAILWAY CLUB.

Windsor Hotel,
Montreal, April 8th, 1919.

Mr. T. C. Hudson (President) in the chair.

MEMBERS PRESENT.

E. R. Battley	R. E. Hall	A. Pope
L. A. Boucher	R. H. Harvey	J. E. Palme
L. Brook	T. Hodgskin	R. W. Peacock
L. Brown	F. W. Hogue	H. A. Pepler
F. Bergen	Norman Holland	W. F. Pomphrett
A. E. Brydges	G. F. Hudson	W. Prowse
J. W. Buckland	A. Jolivet	R. A. Payne
W. E. Buckle	D. P. Lameroux	W. W. Robb
M. M. Campbell	V. G. Lanno	W. H. Robb
M. H. Coleman	E. E. Lloyd	E. J. Robinson
J. H. Craigie	S. C. Lytle	H. L. Rodgers
A. Crumpton	T. Marshall	W. H. Sample
M. Cummings	W. J. Matheson	A. G. Seccombe
E. A. Cunningham	C. Martin	B. F. Shortley
G. de Angelis	A. E. Mimms	T. Sleigh
H. J. Dyke	C. McCabe	E. D. Smith
J. M. Eakins	J. M. McCarthy	W. Spence
W. H. Estabrook	E. S. McNab	S. H. Spry
W. E. Evans	E. S. McMillan	W. H. Stewart
H. Ewan	R. McVicar	H. H. Symmes
Frank D. Fenn	J. B. Macpherson	E. R. Viberg
F. J. Gibson	E. J. McVeigh	C. W. Wells
W. A. Gregory	F. Moore	J. H. Wheatley
H. G. Griffin	A. E. Mimms	W. H. Wheatley
J. Halliwell	R. Partridge	F. O. Whitcomb
J. Hendry	H. Pearce	F. R. Wickson
W. C. Hunter	R. D. Peverley	Jas. Powell
W. J. Hyman	W. A. Pitt	and others

Chairman (Mr. T. C. Hudson):

Will the members please come to order and sign the cards which the Secretary has left in the chairs?

The first order of business is the reading of minutes of previous meeting. The Secretary advises that he has had these printed and copies have been sent to each member: therefore, if there are no objections we will consider them adopted.

The next order of business is the remarks of the president. I wish to draw the attention of the members to the fact that the year is drawing to a close, and I am glad to express my appreciation of the support given during my term of office by the executive committee and by all the members. As you know, we started out under unfavorable circumstances, as we lost our esteemed president at the beginning of the term, and the epidemic of "flu" which was prevalent last fall had a serious effect on our meetings, so much so that some of our members were beginning to lose heart; but I am pleased to say that we have overcome these difficulties and have succeeded this year in attaining the largest membership that has ever been effected in any one year in the history of the club, and it is all due to the fact that the members have put their shoulders to the wheel. On behalf of the executive committee I wish to thank you all for the splendid support given. To-night it will be my duty to appoint a committee to nominate officers, who are to be voted upon when we meet again next month, at which time we are also to have a smoking concert, if the members so decide, and if you decide to have this concert I have a committee appointed to take care of this "Smoker" for you.

The Secretary will now read the list of applications for membership.

Secretary:

The following applications for membership have been received and passed upon by the Executive Committee, and are submitted for your approval:

NEW MEMBERS.

J. D. Brandon, Rep., Security Arch Company, 963a St. Catherine St. W., Montreal.
W. R. Davidson, Gen'l. Sup't., Grand Trunk Rly., Montreal.
G. F. Levesque, Master Mechanic, Q., M. & S. Rly., Sorel, P.Q.
Major S. P. Robins, 805 Eastern Townships Bldg., Montreal.
James Walsh, Locomotive Foreman, Grand Trunk Rly., Richmond, P.Q.

Chairman:

You have heard the names as read by the Secretary. Will someone move their adoption as members?

Mr. Hunter:

I move that they be accepted.

Mr. McVeigh:

Seconded.

It has been moved by Mr. Hunter and seconded by Mr. McVeigh, that these gentlemen be accepted as members of the club. Are all in favor?

Carried.

I declare the motion carried unanimously.

Chairman:

Reports of Committees—none.

Unfinished Business—none.

New Business. Has any member any new business to bring before the club? No new business.

Reports of Special Committees—none.

Secretary:

Mr. Chairman, in view of the resolution passed at the last general meeting, a sub-committee was appointed to report on the revision of the M. C. B. Rules for 1919. Messrs. Coleman, Smart and Robider comprised this sub-committee, and I have Mr. Coleman's report here, a copy of which, I understand, has been forwarded to the M. C. B. Association.

Chairman:

I might say, for the benefit of the members who were not present at our last meeting, that we appointed a committee to represent this club at the M. C. B. Convention, which is to be held this year and who have made a report in connection with changes desired in the M. C. B. Rules. It is customary to do this, and this committee have made a report of behalf of the club, which report is being transmitted to the M. C. B. Association.

Unfinished discussion of paper at previous meeting.—Has any member anything further to say on the paper which we had at our last meeting? It was a lecture by Mr. Holland, who gave us a very interesting talk on the manufacture of varnish, illustrated by lantern slides. I believe Mr. Holland

at that time answered any questions that were asked, and I do not suppose there is anything further to be said.

Secretary:

Mr. Chairman, I would like to call the attention of members to the fact that this club has now practically 1,100 members. We had 252 new members this year, but I now have on my books nearly 300 members who have not yet paid their subscriptions, some of whom have been notified four times. If there are any members you know of who have not paid up their subscriptions I hope you will jog their memories, as I am anxious to have my books in good shape by the end of April. I should like the members to take this to heart, as it will help the club considerably, and I am anxious to get these subscriptions as soon as possible.

Chairman:

Next is the reading of the paper on "Problems in Design and Maintenance of Car Trucks in Relation to Maintenance of Roadway," by Mr. W. J. Hyman, Chief Draughtsman, Car Department, Grand Trunk Railway.

"PROBLEMS IN DESIGN AND MAINTENANCE OF CAR TRUCKS IN RELATION TO MAINTENANCE OF ROADWAY.

By Mr. W. J. Hyman, Chief Draftsman, Car Department, Grand Trunk Railway.

An intimate knowledge of each other's requirements, with close co-operation between the various departments of any great railroad system is absolutely essential, if it is to be operated successfully under present conditions, and I am sure you will agree with me when I say it was because the various departments in our railroads worked harmoniously together, and had a sympathetic knowledge of each other's needs, that they were able to successfully cope with every emergency and difficult problem which developed under war conditions during the past four years.

It seems therefore that as we are now in the great reconstruction period (which we all heard so much about during the war) a study of any subject which vitally affects two or more departments in any of our great railroad systems, is quite opportune, and perhaps may be beneficial in helping to solve some of the problems now before us.

The subject for study to-night covers such a wide field and relates both directly and indirectly to such a multitude of details both as regards equipment and roadway that I can only hope to deal with two of these problems (wheel base trucks in relation to tracks and flat spots) in this paper, and, of course, from the view of the Car Department.

Wheel Base.

The wheel base of a truck is the distance between the centres of the outside wheels on a six wheel truck and of course the distance between the centres of the wheels on a four wheel truck.

Now, at the present time, practically all freight cars in this country have the same length of wheel base under the different classes of cars. A 30-ton capacity car has a wheel gase of 5′ 2″ centres. 40-ton capacity a wheel base of 5′ 4″ centres and a 50-ton car 5′ 6″ centres.

Now, as these three classes of cars are the standard freight cars of to-day I want to make a comparison of the wheel base of trucks under these cars and those of 40 years ago, and you will note the difference between percentages of increase of car capacities and wheel base of trucks.

Standard Freight Cars, 1879.

Average car 40,000 lbs. capacity .....4′ 6″ wheel base
Large car, 60,000 lbs. capacity .....5′ 0″ wheel base

Standard Freight Cars, 1919.

Average car, 80,000 lbs. capacity .....5′ 4″ wheel base
Large car, 100,000 lbs. capacity .....5′ 6″ wheel base

Percentage of increase in load capacity of average car in 40 years, 100%.
Percentage of increase in wheel base of trucks of average car in 40 years, 18%.
Percentage of increase in capacity of large car in 40 years, 60%.
Percentage of increase in wheel base of trucks of large car in 40 years, 10%.

You will therefore see that one of two things must have happened in regard to the wheel base of these trucks. Either the original design was ideal and needed little change or because it was a standard 40 years ago, on account of trying to standardize as much as possible all material, the design has

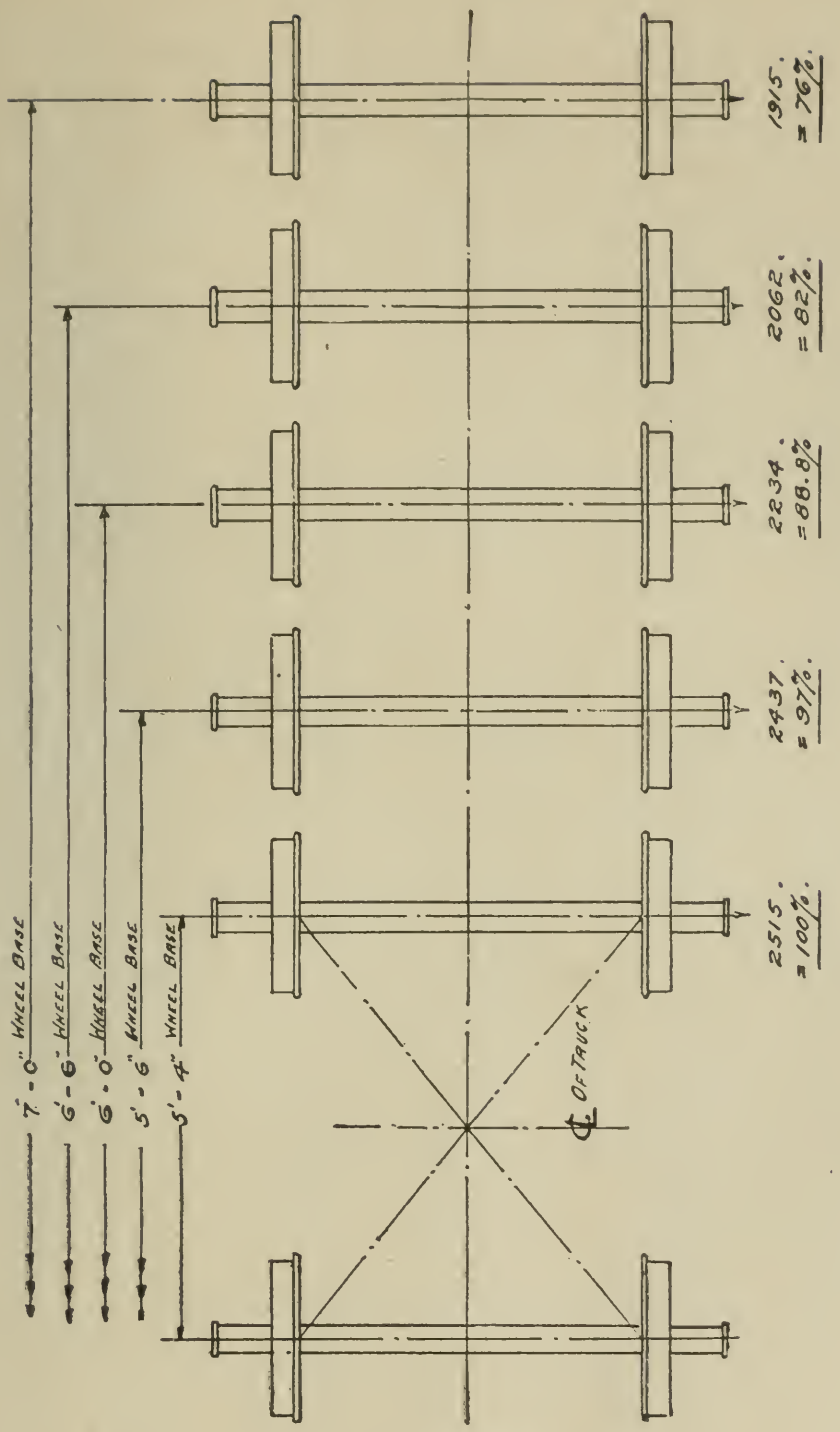
7'-0" WHEEL BASE
6'-6" WHEEL BASE
6'-0" WHEEL BASE
5'-6" WHEEL BASE
5'-4" WHEEL BASE
℄ OF TRUCK
2515.
=100%.
2437.
=97%.
2234.
=88.8%
2062.
=82%.
1915.
=76%.
DIAGRAM SHOWING DIFFERENCE IN TURNING MOMENT AT START OF A 200 FT. CURVE FOR AN 80000# FREIGHT TRUCK UNDER FULL LOAD AT 30 M.P.H. FIGURED ON VARIOUS WHEEL BASES.

DIAGRAM 1

been perpetuated with little thought or study in regard to the changing conditions in capacity of equipment or roadbed.

Now, during this 40 year period great changes have taken place in the construction of the roadbed and contour of track rails, frogs, switches, etc., which have all been standardized. Then the M. C. B. Association have done great work in the standardization of cars and nearly all details which vitally affect the construction of cars have been made standard all over the continent, thus facilitating the interchange of cars on all railroads.

As a lot of these standards, both for roadway and equipment, have a direct relation one with the other, especially in reference to contour of wheels and track rails, it would be practically impossible to change any of these designs without affecting the other and costing the railroads an enormous amount of money, and we therefore turn to truck wheel base to see if a change would be beneficial in the maintenance of roadway, or the reduction of cost in repairs to cars.

On passenger cars we have an 8′ 0″ wheel base for 4-wheel trucks and 11′ 0″ for 6-wheel trucks, and have taken care of certain conditions with a flexible truck to make an easy riding car. Now on freight cars we have a short wheel base 4-wheel truck, and the following diagram shows the turning moment for trucks at various wheel bases under a freight car, at start of curve. (See Diagram 1)

From this diagram it is quite evident that the longer the wheel base the less wear we would have on the ball of the rail at curves and tangents, thus reducing the cause of the removal of a large percentage of track rails at these points. It would also reduce the wear on the flange of the wheel, which is the cause of the removal of lots of wheels, and lessen the thrust on the collar of the journal with the resultant wear on ends of brasses, and this end thrust is thought by many to be the direct cause of the start of a large percentage of hot boxes and anything which would reduce hot boxes would be welcomed by several departments of any railroad.

Another thing in favor of a longer wheel base is that the blow delivered on the end of the rail at the joint would be reduced. Track rails are frequently removed because of the flowing at the end where one joint has become lower than the other, and the constant blows delivered by the wheels of the cars as they pass over the joint gradually cause the end of the rail to flatten out or flow. (See Diagram 2)

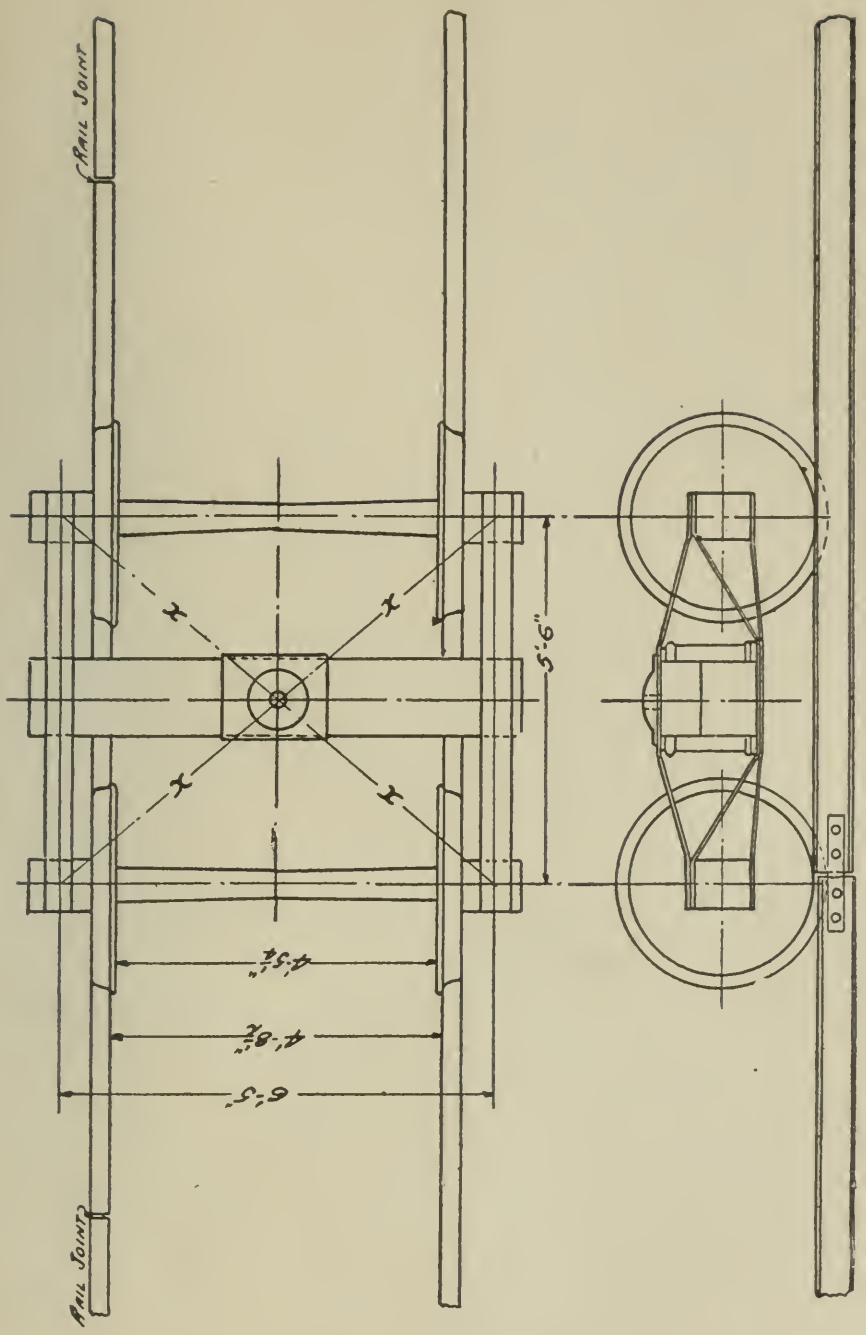
RAIL JOINT
5'-6"
4'-5½"
4'-8½"
6'-5"
RAIL JOINT
DIAGRAM SHOWING WHEEL SUSPENDED BEFORE DELIVERING HAMMER BLOW ON LOWER RAIL.

Diagram 2

It is impossible to figure out a formula to arrive at the blow delivered at these joints, owing to the fact that so many factors enter into the calculations which vary at every joint, especially in the ballasting of the road and the wheel base of car itself, also the speed of the train, etc., but one thing is certain and that is proved by practical demonstrations by the Track Committee of the American Railway Engineering Association, that in proportion as the wheel base of a car is lengthened up to a certain reasonable point, this blow is decreased and the life of the rail would be proportionately longer.

Now the stresses produced in the rail through the different wheel bases is another factor to be considered, and the following diagram shows the deflection in the rail caused by different wheel bases of trucks under exactly similar conditions.

(See Diagram 3)

This diagram shows that a higher stress is produced in the rail through the short wheel base truck owing to the concentration of load over a shorter area. It also shows that the track rails will be tilted upwards at the ends thus creating a worse condition for the hammer blow from the wheel as it passes over the joint of the rail. Of course the condition of the roadbed, ballasting, etc., must be considered with this diagram, but it is a fact that the longer wheel base would distrubute the load and reduce the stresses in the rail.

Flat Spots.

Flat spots on wheels and their effect on track rails is a very debatable subject, and as it is claimed that flat spots are the direct cause of a certain percentage of broken rails I want to consider the proposal that has been made for several years now, that the maximum length for removal of wheels for flat spots be reduced from 2½" M. C. B. present standard to 1½".

Now I want to go back forty years again. In 1879, when the large freight car wheel load was but 8250 lbs., the M. C. B. Association fixed the allowable limit of flat spots at 2½", and although wheel loads have increased to 18,750 lbs. (100,000 lb. cap. car) and as high as 30,000 lbs (170,000 lb. cap. car), and the speed of trains is now much greater, the present M. C. B. rules retain the allowable limit at 2½".

The impact from a flat spot under the modern heavy car is many times greater than the impact from the car of 1879, when the present limit was fixed—due to much higher speeds and the fact that the maximum wheel load is now nearly 4 times heavier than in 1879.

It is a fact that rails are broken by flat spots though specific

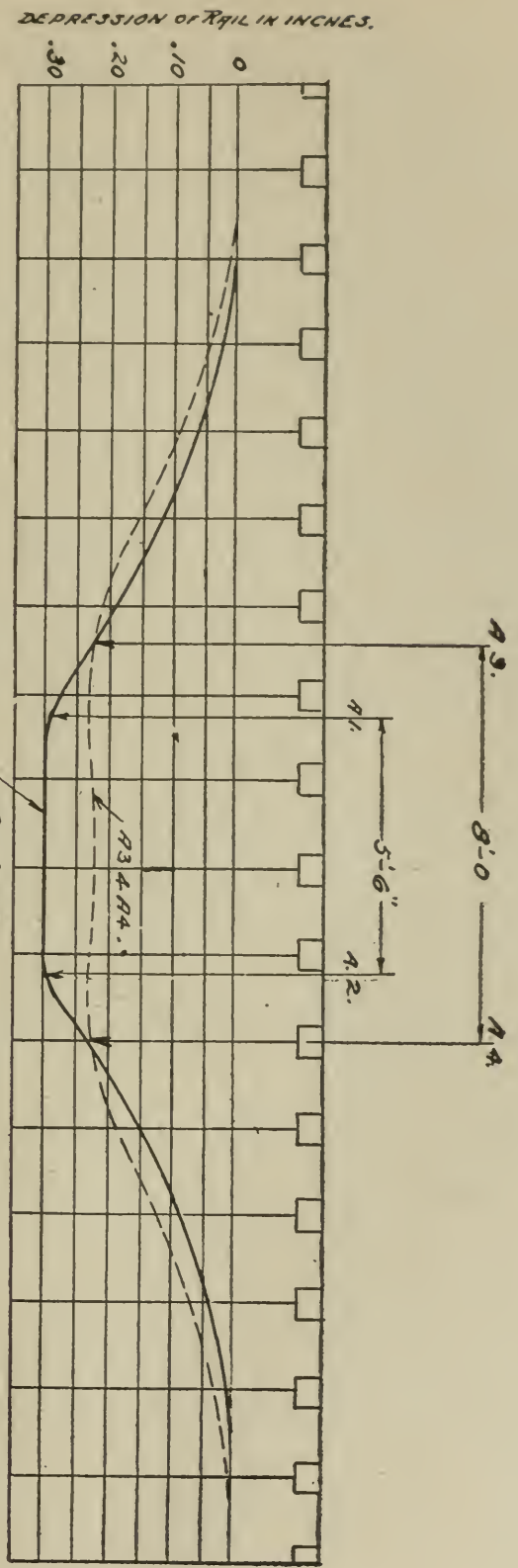
DEPRESSION OF RAIL IN INCHES.
.30
.20
.10
0
A 3.
A 1.
5'-6"
A 2.
A 4.
8'-0
A1. & A2.
A3 & A4.
A = 17500 LBS. PER WHEEL.
85 LB RAIL.
12" BALLAST.
ACTUAL DEFLECTION CAUSED BY WHEEL LOADS UNDER ONE TRUCK WITH 5'-6" CENTERS. = ------ A1. & A2.
ACTUAL DEFLECTION CAUSED BY WHEEL LOADS UNDER ONE TRUCK WITH 8'-0" CENTERS = ------ A3 & A4.

Diagram 3

cases have been difficult to cite, because often the rail while badly damaged, may not break until some time after the passage of the flat wheel.

Ordinarily wheels having 2½″ flat spots are removed from the axle and scrapped, whereas if the limit were fixed at 1½″ it would be possible to reclaim such wheels and replace them in service by grinding out flat spots without removing the wheels from the axle and at a cost of about $0.50 per pair. Grinding is being done with excellent results on a number of roads, and it is recognized by authorities as good practice, provided, of course, that the wheel has not been burned during the process of flattening. Therefore a reduction of the allowable limit from 2½″ to 1½″ would not only lessen the impact and damage to the rail, but should prove economical from the standpoint of service life of wheels.

It is impossible to determine the force of the blow from the flat spots, as this depends so largely upon the amount that the rail gives under the impact, but to arrive at some conclusion as to the energy of the impact the American Railway Engineering Association Track Committee made some tests, report of which I quote here.

Assuming a 33″ wheel and 2½″ flat spots we determine that for the modern car at average speeds the factor of safety for a 100-lb. rail was about 5, but for the heaviest cars about 2.75. According to this formula the impact from a 2½″ flat spot under the modern 50-ton gondola at 45 miles per hour is about 10 times greater than the impact from the old standard 20-ton car at the then maximum speed of 20 miles per hour.

It would therefore appear that flat spots should be reduced from 2½″ to a maximum of 1½″.

There is a lot of argument to-day in regard to the length and the angle at which brake head hangers should be hung, and we are told that flat spots on wheels are frequently caused on this account; and on our latest freight cars we are using longer hangers and trying to remedy the bad effects caused by tilting of shoe through short hangers and dragging of shoe on wheel; and on passenger trucks the clasp brake is a remedy for the ills of the old time brake gear, so this is one case where in passenger service an improvement is gradually taking place.

In summing up, therefore, it appears that a larger wheel base, say 6′ 0″ approximately for freight cars, would be an improvement over present standards, and a thorough study of the cause of flat spots on wheels should be made to eliminate this trouble and also a reduction made in maximum length from 2½″ to 1½″ on freight car wheels.

Chairman:

I am sure the members will appreciate the points brought out by the paper to-night, especially that in respect to the present M. C. B. limit of wear. The absolute fairness of the paper will also appeal to everybody, and as I followed the reader I was inclined to believe that at some time he had been a roadmaster. It is not often that we find a mechanical officer who is prepared to come forward and put the "cards on the table" as Mr. Hyman has done to-night. I am sure there is considerable room for discussion, and I know Mr. Hyman will be only too pleased to answer any questions that may be asked.

Mr. S. H. Spry:

I understand it is the practice on some roads to grind the wheels before they put them in service at all. Am I right in this?

Chairman:

Yes, I think it is the practice on a few roads.

Mr. McVeigh:

It is customary when a man gets up to speak on a paper of this kind to always compliment the writer of the paper. This has got to be a habit and is done in a stereotyped manner; but in regard to this paper I can compliment Mr. Hyman and can claim that I am not doing it because it is a habit, but because it is a very excellent paper and really deserves a great deal of credit.

In regard to the question asked about grinding wheels before being put into service, it was years ago that I had personal knowledge of the grinding of wheels before putting them into service, but I do not know of any railway in America that makes a practice of grinding cast iron chilled wheels that are going under freight cars, although it is a fact that before the use of cast iron wheels was abandoned under coaches some roads had all the cast iron wheels for coaches ground before application, so as to make the wheels more perfect, and I can remember that when we placed an order for coach wheels in those days the order read that the wheels had to be ground, centred and balanced. The balancing of a wheel is rather a vague thing, but they had to be ground so as to make the tread absolutely smooth, and after the wheel was put on the axle it was a perfect circle from the centre of the axle. This is very important, as with the wheel out of centre

and the rough tread, when the brake is applied it has a greater tendency to bring the wheel to a standstill and skidding results, which would not take place if the wheel was a perfect circle and had a smooth tread.

Now, Mr. Hyman has brought into his paper the question of grinding flat spots out of chilled wheels. I believe I was the first man who mentioned that in this club, but if anyone wishes to accuse me of being the instigator of this practice I shall feel proud, as I believe it is right.

When the Engineering Association started out to make an investigation they were only considering this from the standpoint of the Road Department. Their recommendation (and I agree with them) was that flat spots should be reduced, the maximum being 1½", and they actually did reduce it to ½", but some fellow got enthusiastic and thought that if 1½" was good ½" would be better, but the practical man knows that ½" flat spot on a wheel is practically nothing, although when the 1½" is agreed to I think the grinding of wheels will come into general practice. Personally I have felt for a long time that the 2½" flat spot was much too great, and I do not believe that any man can stand by a railroad track and watch a freight going by such as we have to-day, and hear the pounding without reaching the conclusion that damage is being done not only to the cars but to the rails also. One reason why we do not get more information on this particular feature of the subject is that the cause of the damage is not immediately apparent, as the trouble is caused by a succession of blows delivered by these flat wheels, and when the rail does break it breaks in ordinary service. We have seen cases where a locomotive has gone out with flat spots on her drivers and the people responsible for turning the engine out in that condition have been nervous and have watched that locomotive closely, and the results have been about the same as outlined in that report, but you bet they did not say anything about it, although they were the only ones who knew. That is the reason why we do not get these details. The facts are forgotten. Naturally you will say that the blows delivered by the flat spot on a car wheel have little to do with the blows that would be given by a flat spot on a locomotive driving wheel. That is very true. But would it not be reasonable to suppose that the blows from a flat spot on a car wheel would cause disintegration of the rail in a period about three or four times as long as this would take place in the case of the locomotive? There are some people who say that a piece of steel, owing to its elastic resistance, will take a blow a million times without

injury, but as soon as the blow gets slightly beyond the elastic limit of the steel the damage occurs. My idea is that a constant shock will ultimately destroy a piece of steel. I saw an illustration of that some years ago, when a hand drill had been in use for a considerable time. I was standing beside the man who had brought it to the bench after using it for three or four hours, and when he laid it on the bench it fell to pieces, and when examined it was found to be crystallized. It had been receiving shocks. It had been destroyed by shocks; and I have the theory that steel can be destroyed by shocks. If that is true let us by all means reduce the shocks.

Mr. Cunningham:

When I heard the speaker of the evening mention the grinding of flat spots, I looked around for our old "war-horse" Mr. McVeigh, to see if he was within reach, and I am glad he has responded to the occasion. Some years ago I had occasion to visit the Pennsylvania Road to study this question, and I might answer the question about the grinding of wheels. The Pennsylvania grind their cast iron wheels, with the exception of the wheels under the caboose cars, which cars have the four-wheel trucks, and under an arrangement with the trainmen they grind these. They have been grinding wheels for many years, and it has become a regular practice. When a wheel develops a flat spot it is sent to the shop and ground and put back into service again, and the practice has become so common that they do not keep any record of the wheels so ground. I would like to ask for some information from the author of the paper as to how many of the roads are grinding wheels to-day. I know that the Pennsylvania and Sante Fe follow the practice.

Mr. Hyman:

My information on this point is to the effect that there are only two roads on this continent that grind cast iron wheels, the Pennsylvania and the Sante Fe, and it is the usual custom to take wheels out of service with flat spots and grind them once, but the Sante Fe claim that they have ground the same pair of wheels three times for flat spots and have obtained good service from them after the third grinding.

Mr. Cunningham:

My special reason for asking that was to ascertain whether the roads that ground their wheels, operated under the same conditions as we do, and also whether any progress had been made outside of street car lines, in following this practice.

Mr. Hyman:

While investigating this subject in reference to grinding of wheels this question arose as to whether it would be beneficial to use cast iron wheels from which flat spots had been removed by grinding in this climate, but I think this point has already been taken care of, because we accept the Sante Fe cars on our lines and run them up through this country, and if we can do this and not have any trouble with them why should not wheels that have been ground and applied to our own equipment up here in this climate give good results.

Mr. Sample:

Speaking on this subject of grinding wheels—Mr. McVeigh has always been an advocate of this practice, and I have looked into it at different times to a considerable extent. It is my understanding from information received that the Sante Fe are not applying ground wheels to all of their equipment, and the cars so equipped do not leave their line. In connection with this subject I would like to ask to what extent the wheel is ground; in other words, how big a flat spot can be ground out with the assurance that the wheel will perform satisfactory service? Another question I think we should ask ourselves is, what is the cause of flat wheels? As a rule it is a burn. So far as I am able to judge, I think there should be some regulated practice in regard to the grinding and the depth of the chill will govern the extent to which the flat spot may be ground out. If it goes beyond or near the end of the chill it would of course be unsafe to operate the wheel except in light service. I did not know, until Mr. Cunningham spoke, that they were using ground wheels extensively on the Pennsylvania on main lines, but that may be the case. I should like to ask Mr. Hyman if he knows to what extent wheels are ground out.

Mr. Hyman:

In that connection I have a blue print here which shows the amount which must be taken off the wheel to grind out flat spots of various lengths: 1″, 1½″, 2″ 2½″ and 3″ in extent. A 2½″ flat spot will take 1/16″ exactly to grind out. The chill on the wheel, according to M. C. B. specification, must be not less than ½″ or more than 1″ thick and the average chill is ⅝″ thick, although it runs down in some cases to ⅞″, but it is very seldom we find areal good chill more than ⅝″ deep, from this point it begins to string out into the softer metal. It would be possible to grind a 2½″ flat spot three times if the

chill was 5/8" thick and still retain a factor of safety, but after that you would begin to get into soft metal and I think that if the wheel was ground twice for 2½" flat spots it would be the maximum we could expect, but if the limits for flat spots on wheels das reduced from 2½" to 1½" in length we would be able to grind the wheels four times with safety, at it would only take 1/32" to grind out a 1½" flat spot.

Mr. Cunningham:

I made a study of the Pennsylvania practice, in which an engineer was placed at my disposal, and we went into the matter very thoroughly. The wheel is ground on an ordinary grinder which has two heads. The centre of the axle is made to revolve the wheels against the grinder, which has from ¾" to 1" bearing against the wheel. The grinder moves across the face of the wheel and a plentiful supply of liquid is used to prevent the wheel from getting hot. A 2½" flat spot is the limit to which they go. They lift the wheels with an air hoist to set them in the machine and take them out, and as soon as they are finished they are put back into service again. The cost of the work is about 26 cents and if they put a man on each head they can do the work in half the time, or nearly so. They have been following this practice for a good many years and it gives good results.

Mr. McVeigh:

Mr. Sample has stated he has information to the effect that the Sante Fe are not using their ground wheels in regular service. In the reports I have received from the Sante Fe this was not mentioned. I am going to ask Mr. Sample from whom he got his information and I will tell him from whom I got my information. I got it from the mechanical men of the road and one man, a mechanical engineer, was very enthusiastic about the grinding of wheels, and even went so far as to say that they could grind out a 4" flat spot. I went to Chicago and made a test of wheels, taking a certain number, some having flat spots running from 2½" to 4". I took these wheels out to the foundry where they make wheels and had them grounod. and after grinding we took them out and broke them. We broke some right straight across where the flat spot had been. In the 4" spot we found the wheel had been burnt, but in the smaller spots there was nothing to show that the wheels had received injury. We measured the chill and found it just as Mr. Hyman has described, from 5/8" to ¾", and one wheel 7/8". There is no difficulty in putting a chill an inch

thick on these wheels if we so desire and if called upon the manufacturers would do so, and you could then make as many grindings as required. But even admitting the tendency to weaken, could we not, if we found the practice of grinding wheels practical and economical—could we not strengthen the wheel from the inside of the tread and put a little more metal into it? It would be a factor of safety and would carry the rick we might incur in grinding. I believe the day will come when we will not put a cast iron wheel under a car until it has been ground smooth. I say this because I noticed that when we put these wheels I have been speaking about on the grinder there was not one of them would touch it all around. Every wheel we tried was off centre.

Mr. Pitt:

I think there are other defects that ought to be thought of and that is the brake burns. Mr. McVeigh advocates the practice of grinding wheels but there may be defects in the wheel that are not apparent, and it would be weakened without our knowledge. When a wheel gets overheated there are furrows which form through the wheel, and while these are not discernable, if the wheel is put into service it is liable to break. I think we should be very careful about the wheels we select for grinding because a large percentage of the wheels taken out of service are discarded on account of brake burn.

Mr. McVeigh:

I agree with Mr. Pitt that we should use some common sense in grinding wheels, but we should also use common sense in any work that is undertaken. If a wheel shows defects it should not be ground.

Mr. Sample:

In answer to Mr. McVeigh's question as to who furnished me with the information about the Sante Fe, I would say that it was Mr. Purcell, Engineer of Motive Power and Equipment, whom I know personally. The point I want to make in this: that the distance you can grind the wheel depends entirely upon the depth of the chill. If we know accurately the extent of the chill then we know how far we can safely grind the wheel, but in the absence of that knowledge I think we shall be taking chances. That is my opinion. Mr. Purcell told me that they calculated to keep these ground wheels in branch line service or for light service on their own road.

Mr. Brown:

A few years ago I was present at a meeting of the M. C. B. Wheel Committee and when this question came up there was not one who would advocate the grinding of wheels. The Pennsylvania road was the only one which seemed to be agreeable to the grinding of cast iron wheels. When the wheels are cast and chilled it leaves a series of fins on the outer edge, and while it may be all right to grind a wheel in which you know the limit of the chill we cannot depend on the wheels when you come to go to outside foundries for them. It is true that during the past year there has been an effort made to accept No. 6 wheels that had been condemned, and in many cases it would be money wasted to attempt to grind these wheels, to say nothing of damaging and weakening them. I think if you went into that you would run considerable risk and possibly cause a serious accident. The wheel manufacturers themselves who advocate this grinding are in many cases afraid of the cast iron wheel and are going to the steel wheel. It seems to me we would be taking a retograde step in adopting this practice.

Mr. McVeigh:

If we have a large percentage of wheels under our care that are not ground we cannot call them in very good condition. In so far as controlling the chill is concerned, as mentioned by the last speaker; the manufacturers of wheels (and I have talked with a good many of them) say they are willing to put a chill on the wheel up to an inch thick, and they have got to stand behind their wheel. If they put a 3/8" chill on the wheel and it broke they would find themselves in very serious trouble. Personally I have no fear about the manufacturers being able to put a good chill on the wheel. A few years ago they considered the railways very foolish in not grinding out flat spots up to 2½", but it was not up to them to advocate this as it would mean they would sell less wheels, but they have changed their attitude now because the advocates of the steel wheel are getting stronger, and the cast iron wheel manufacturers want to show that their wheel can be made to last and give increased mileage.

Mr. Frank Fenn (Crane Co.):

I want to take this opportunity of bringing you the most cordial and friendly greetings of the Western Railway Club, Chicago. I am a stranger here to all except Bob McVicar, and I do not believe there is a man or woman born since the beginning of this century that has not met Bob somewhere or

under some kind of circumstances. I have enjoyed your meetning, although I did not get in until the paper was about half completed, and am glad that the paper came from the right family of my old friend Jim Coleman. I have been going to see him for several years, but always when I call him up I receive the reply that he has gone to Chicago. The paper I have heard was mighty good, and I will say to you that the Western Railway Club has nothing on the Canadian Railway Club when it comes to discussion. I heard one man called a war-horse, and I wish we had a lot of them, because they are the life of a railroad club (laughter). I am glad to see you have such a fine representation. I do not know how many supply men there are among them but I have my suspicions. In the Chicago Club we have something like 25 or 50 railroad men at our meetings and about 100 supply men. (Laughter.) I am sorry I do not know more about a car because I want to tell you about a sleeper I rode in between Chicago and Detroit. It took me back to the days when I rode a bucking broncho in Kansas. I don't know what ailed that car. Sometimes the wheels were flat and sometimes they were not. That car rode all right at certain speeds and in certain places, but all of a sudden it would take the notion to pitch and toss, all of which disturbed me mightily. I tried to figure it out with the porter next morning but he said he hadn't noticed anything. (Laughter.) Probably he did not have as good company as I had before I left Chicago. I have enjoyed this meeting very much. I did not know you were going to meet here until I called up Mr. Coleman's house and was told by his daughter that her brother was coming to the meeting, then I came along. I shall be glad to have any of you visit the Western Railway Club when in my city. (Applause.)

Chairman:

I am sure, Mr. Fenn, it has been a privilege to hear you, and on behalf of this club I extend you a cordial invitation to again visit us any time you are in the city.

Mr. Pyne:

I have not very much to say upon this subject. If I remember aright, the subject that has been discussed to-night was brought up before by Mr. McVeigh at a previous meeting of this club, and it has evidently been the means of starting something to-night. While there has been a full discussion on this question of grinding wheels the most important feature of the paper, that is, the removal of wheels for flat spots from 2½"

to 1½", has not been touched upon. He mentioned, however, that if this new standard was adopted it might lead to the grinding of the wheel. The other question raised is the adoption of a uniform standard of wheel base. I am not a car man and have nothing to say on matters where only experts should be heard, but I have to pay my little tribute to the writer of this paper and compliment him because I feel it is a very able one and one which must appeal to car men. I am not a car man and am here to learn. I should like to hear someone discuss the other two points in the paper, but in so far as the grinding of car wheels is concerned, I am not in favor of it at present, although I may become a convert later on.

Mr. Brown:

I must apologize for getting up again, but I want to say that the paper is an excellent one and gives us some very good ideas to talk about, but I cannot get the idea of the writer that the long wheel base will reduce flange wear. It has always seemed to me that the longer the wheel base the more danger of the flanges wearing, and it also gives a greater strain on the rail. I want to think it out a little more fully. I want to point out, however, that the M. C. B. Association recommended the use of a truck with 5′ 10″ wheel base for 70-ton cars, so that he may be right.

Mr. Hyman:

In that respect the formula from which the figures were worked out on diagram 1, showing turning momements of trucks, proves conclusively that the longer wheel base will reduce the friction on the ball of the rail in going around curves. I would also like to bring out another point in this connection, in reference to 6′ 0″ wheel base. I had a discussion in connection with this paper with Mr. F. H. McGuigan, Jr., who was appointed last year Chairman of the Track Committee of the American Railway Engineering Association, and was Principal Assistant Engineer on the G. T. R., but has now left the service, and in connection with the stresses produced in the rails by different wheel bases on trucks he had two diagrams and figures which proved conclusively that a 6′ 0″ wheel base was the ideal condition for a 100 lb. raid and a good roadbed.

Mr. Mimms:

As I understand this, it is a question of the length between

the centre pin and the truck. So far as the curvature of the track is concerned, I do not think the length of the wheel base enters into that at all.

With respect to grinding of car wheels: is it not a fact that if you take a section of the chill off, which you say is 5/8" thick, you will have that much less metal, and if you grind off the top metal to where the metal is a bit softer you will open the pores and the wheel will then wear much more quickly and develop flat spots after it has been ground.

Mr. Cunningham:

The Pennsylvania found there was no difference in the chill of the ground wheels and those just manufactured. The chill extend from 3/4" to 7/8" after which it becomes a bit soft.

Chairman:

Did they find the chill regular right through the 7/8" section?

Mr. Cunningham:

Yes, pretty regular, and so far as the wear is concerned, they found absolutely no difference between the ground wheel and the wheel before it was ground.

Chairman:

It did not open up pores in the iron?

Mr. Cunningham:

No, it was the same as before.

Mr. Holland:

About 20 years ago I had considerable experience in this subject of chilled iron. At that time I was working for the Canadian Foundry Co. and was the first man who tried out the chilled iron. I was able to get a chill absolutely uniform up to 7/8" or 1", and in grinding you could not see any difference down to 7/8" or 1". I fail to see why you could not grind all wheels with a satisfactory chill and still get good service.

Mr. Mimms:

I can say that a flat piece of steel will take a more uniform chill than a car wheel, as you have not got the shrinkage to contend with. I have seen a grey iron casting made, and that casting break 12 hours after it came out of the foundry and when in the machine shop ready to be planed. We found the design of the casting was such that it cooled more quickly on the outside than in the centre. Is there not some action which takes place in the cooling of the wheel and which will result in

a difference in the metal from the base of the chill to the outside of the wheel.

Mr. Holland:

It depends on the metal.

Chairman:

My understanding is that it is a matter of a good foundryman who is able to maintain the chill from the outside and make it uniform.

Mr. Hyman:

From my own observation it seems to me that we can always depend upon a good chill of ⅝" deep. The average life of the ordinary cast iron wheel is from eight to ten years, and when it has been in service this length of time the tread is worn down about ½" or the diameter of the wheel is decreased about 1". I am well aware that broken or thin flanges are responsible for a large percentage of wheels being removed, but I think this proves conclusively that if there is a good chill down to ⅝", the wheel will give good service.

Chairman:

We have had a good discussion, but I do not see any Master Car Builders getting up and saying they would reduce the limit for flat spots down to 1½" in removing wheels. I should like to hear from the car men, as this is a matter that has been under consideration for several years. It is a question if it should not be reduced to 2" under our heavily loaded cars.

Mr. Cunningham:

I cannot speak on that, Mr. Chairman. I think the subject is under discussion by the M. C. B. Association at the present time but a decision has not yet been reached. I would ask the author of the paper if he has any data to show the percentage of failures of wheels, and can he say how many flat spots developed during the first year of the life of the wheel?

Mr. Hyman:

I have no data or record of any description to show percentage of failure of wheels, but I have some data here which, I think, favours the reduction of flat spots from 2½" to 1½". Sometime ago a test was made by one of the western universities by means of an instrument which recorded the force of the blow delivered by flat spots, photographically. In these tests, which cover flat spots of various lengths, it has been found that a wheel with a flat spot 3" long, under a car going

16 miles an hour and carrying a load of 20,000 pounds strikes a blow of 104,000 pounds. Under similar conditions a flat spot 2″ long produces a blow of 25,000 pounds, and a flat spot of 1½″ produces a blow of 20,000 pounds. I think this proves conclusively that flat spots should be reduced from 2½″ to 1½″.

Mr. Cunningham:

I should like to know how many cast iron wheels fail during the first year of their service. If I remember rightly it is about 8%. If grinding costs only 26 cents and will give us eight or nine years additional service from the wheel it is worth while considering.

Chairman:

There are some good data in a paper read before this club some years ago. You will find it in the files of the club if you wish to examine them. This paper went into it very thoroughly at the time. It was a cast iron wheel argument and the question was whether we would carry on with the cast iron wheel. I think it would be well worth going over again. If there is no further discussion a vote of thanks will now be in order.

Mr. Brown:

I have great pleasure in moving a vote of thanks to Mr. Hyman for his paper, which has given us such a good discussion.

Mr. McVeigh:

I have pleasure in seconding that motion. We became so enthusiastic on the question of flat spots that we forgot some of the other important points of the subject, which I would be very willing to discuss and would like to hear a little further along that line at some future meeting.

Chairman:

It has been moved by Mr. Brown, seconded by Mr. McVeigh, that a hearty vote of thanks be extended to Mr. Hyman for his instructive paper. All signify in the usual way. Carried (applause). I declare the motion carried. Mr Hyman, it is a pleasure to extend the thanks of this club for your instructive paper. It has been appreciated very much.

Chairman:

Before closing this meeting I would say that it has been customary at the April meeting to appoint a committee to select or nominate officers for the coming year, and who are to be voted

upon at the next meeting in May. I have much pleasure in nominating Mr. G. M. Wilson, Supt. of Motive Power, Grand Trunk Railway; Mr. W. E. Joyce, Travelling Engineer, Canadian National Railways; Mr. J. A. Shaw, Electrical Engineer, Canadian Pacific Railway; Mr. A. Allan, Holden Co., Ltd.; Mr. J. J. York, General Works Manager, St. Lawrence Sugar Refinery Co.

There is also another question which should be decided now, and that it whether we shall have a ',Smoker'' at our next meeting. I should like to hear from the members on this. We have had a very successful year, from the point of membership, and while it is true that our finances will show up a little less than in former years, we have had a number of men overseas whose dues we have carried. Also we held our Annual Banquet, and while we had a good time, and it was the first in a number of years, we cannot spread ourselves on an occasion like that and cover the expense by the amount we receive in connection with the banquet itself, but I think that all enjoyed themselves, and there is in any event the question whether we should go ahead and pile up a large surplus. Some of the members think we should have some social enjoyment as we go along.

Mr. Cunningham:

I would move that we have a ''Smoker'' in connection with our Annual Meeting.

Mr. Hunter:

I second that.

Chairman:

It has been moved by Mr. Cunningham, seconded by Mr. Hunter, that we hold a ''Smoker'' at the annual installation of officers next meeting. Is there any further discussion. If not I will ask the members to signify in the usual manner. Carried unanimously. It only remains now to appoint a committee, and I will nominate to look after the ''Smoker'' Mr. Norman Holland, Mr. V. G. R. Vickers, Mr. E. D. Smith, Mr. E. A. Nix, Mr. Frank Cooper, Mr. A. A. Goodchild.

All in favor please signify in the usual manner.. I declare this committee appointed unanimously.

The Secretary advises me he has prepared coffee and sandwiches in the room at the rear and we shall be glad to have all stay.

I declare the meeting closed.

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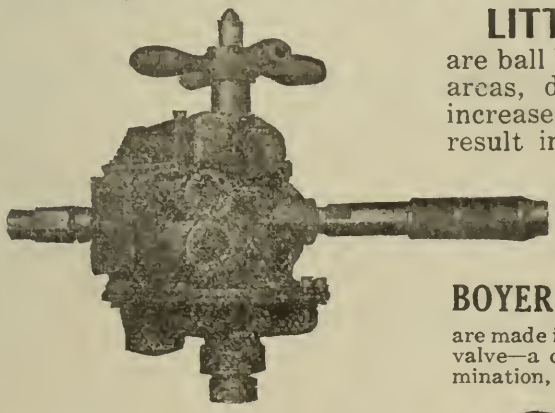

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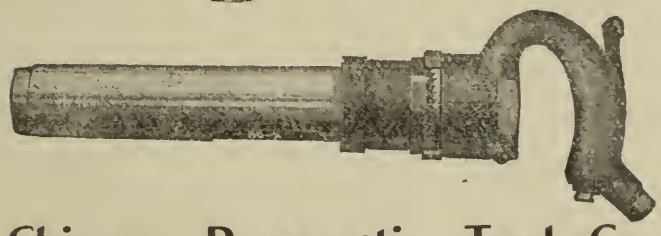

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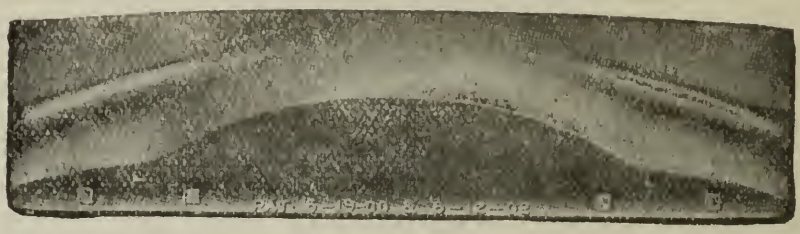

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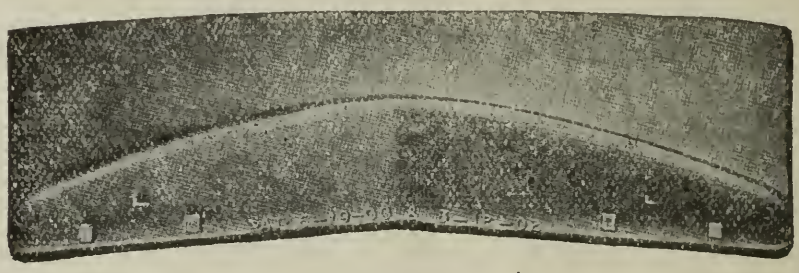

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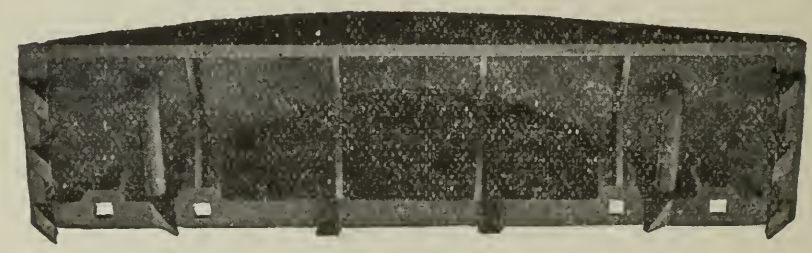

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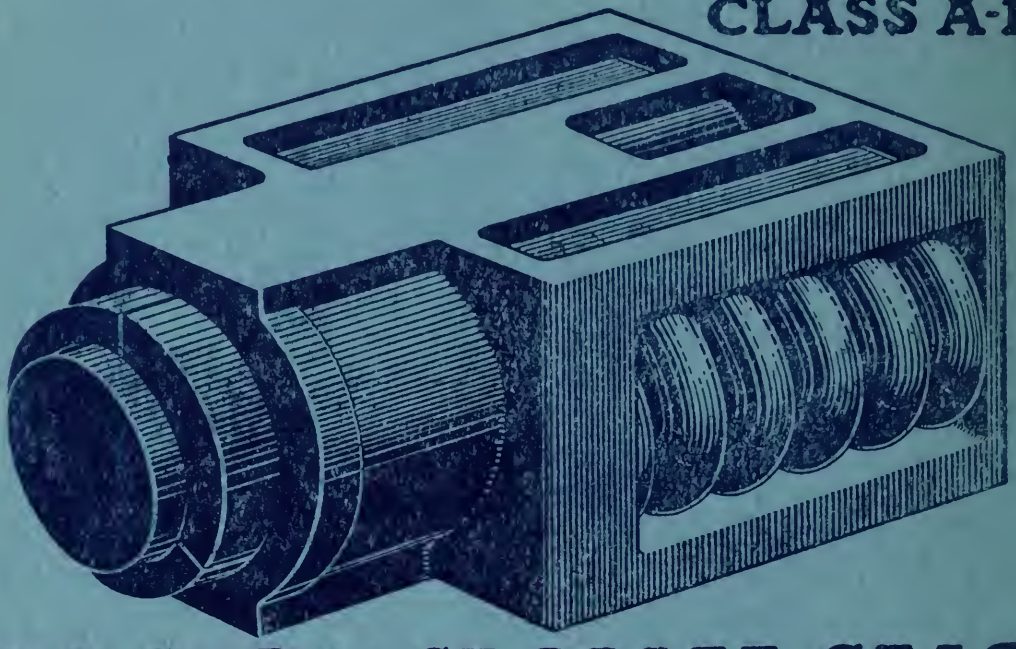

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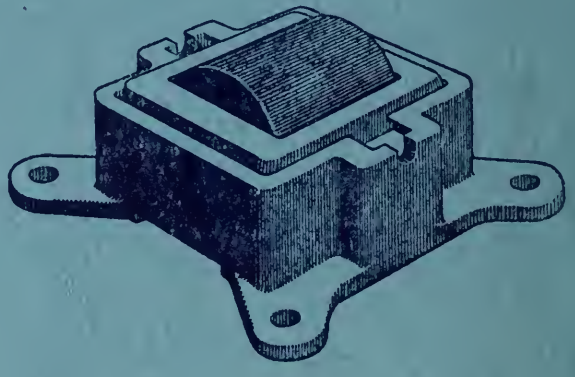

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